Ansys

SYSTEMS

VRXPERIENCE Sensors

High-fidelity physics-based camera and lidar sensor simulation with ground truth information, Ansys VRXPERIENCE Sensors is part of the Ansys VRXPERIENCE product family.

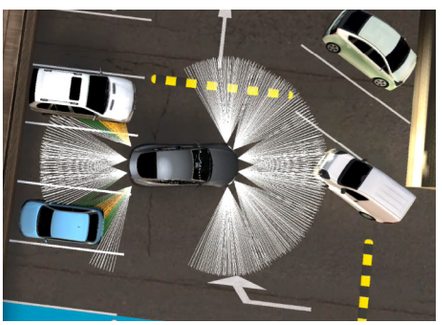
/ Driving scenario

Using driving scenarios, you can create and simulate simple driving situations that can include several vehicles. With the sensor testing scenarios, several cars can be added to the simulation to create more complex environments, such as following a car and monitoring the path of a crossing car simultaneously. Each vehicle in a scenario can be static or automatic:

- Static mode enables you to perform static evaluation at a specific point of interest.
- Automatic mode enables you to drive along a predefined trajectory while the operator stays focused on the headlamp-lighted pathway.

Ego-vehicles can be added to a basic vehicle dynamic simulation to test simple driving situations using either a keyboard or a Logitech© steering wheel. More advanced scenarios and vehicle dynamics can be addressed in cosimulation with Ansys VRXPERIENCE Driving Simulator powered by SCANeR™.

/ Ray-casting ideal sensors



Ansys VRXPERIENCE Sensors has ideal models of ultrasonic, camera, radar, flashing lidar and rotating lidar sensors. The ray-cast output of these sensors can be used in ANSYS® SCADE®, MATLAB® Simulink® or a C++ plugin.

With the ideal sensor feature, you can define a sensor's specifications or develop new ADAS features. Sensor data output (lightning strike hit point, material properties) and vehicle parameter input/output (position, orientation, speed, steering wheel angle, etc.) are available in the interface. This feature also provides ground-truth data.

Thanks to the consistent combination of data from multiple sensors, the simulation enables you to validate the model of a smart sensor's behavior or its fusion algorithms.

Deterministic and real-time modes are both supported. VRXPERIENCE and ANSYS SCADE, MATLAB Simulink or C++ plugin synchronization produce repeatable results.

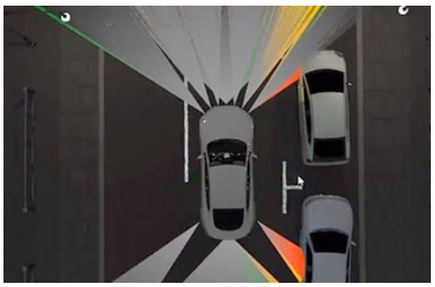
/ Camera sensor

Ansys VRXPERIENCE Sensors includes a high-fidelity, real-time, physics-based simulation of cameras. The software contains a parametric model of camera, which enables you to simulate every actual camera model. This model simulates all components such as the lens system, imager and pre-processor. For automotive front-facing cameras, the windshield can also be considered in simulation.

The simulation considers the optical properties of the environment in visible range, along with the optical properties of the lens system (distortion, chromatic aberration, etc.) and the optoelectronic properties of the imager (color filter array, dark current noise, etc.). With the addition of plugins, the simulation can manage dynamic adaptation (autoexposure, white balance, thermal incidence, etc.).

The camera simulation creates raw images, which are used to test and validate perception algorithms either as models (model-in-the-loop) or software (software-in-the-loop).

/ Lidar Sensor

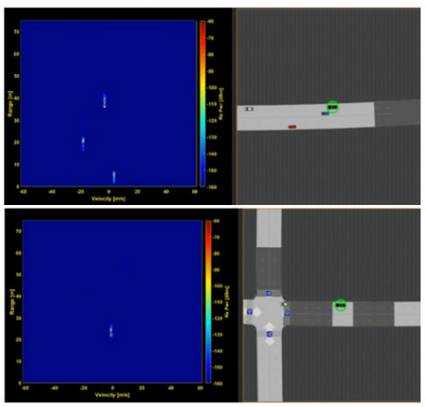


Ansys VRXPERIENCE Sensors integrates the simulation of ground-truth sensors for the lidar model. The physics -based lidar model is designed to accurately reproduce the behavior of the IR emitter and sensor. All types of lidar technology (scanning, solid-state, flash, etc.) can be parameterized in the software.

Powerful graphical visualization capabilities enable you to assess your complex ADAS systems and autonomous vehicles virtually, by connecting optical and functional operations in a single driving simulator.

You will benefit from powerful ray-tracing capabilities to recreate sensor behavior and be able to easily retrieve sensor results through a dedicated interface. This solution provides a unique way to collect virtual sensor information during real-time drives and use the information to develop autopilot code.

/ Radar Sensor



Radar is prevalent in driver assistance systems thanks to its high precision and exceptional scalability. Ansys VRXPERIENCE Sensor provides a radar model based on ROM simulation technique. It is valid for automotive applications to ease the virtual design, test and validation of radar systems.

Based on coherent radar cross-section (RCS) data for targets (cars, trucks, infrastructures, etc...) over a range of frequencies and aspect angles, the ROM-based radar model simulates the radar echo of complex scenarios in real-time. For a guaranteed accuracy, radar cross-sections are FF-RRP (Far-Field Rotated Range Profile Reduced Order Model) generated directly from the Ansys HFSS. On top of pre-generated input, the parametric model considered radar layout (Rx and Tx positioning, number of channels, interleave mode, etc...) to fit to specific automotive radars. The data collected out of the radar model is used to efficiently stimulate the algorithm of radar ECU digital signal processing (DSP), to quickly improve the accuracy and robustness of automotive radars in edge cases. Ansys VRXPERIENCE comes with a library of ROMs for target in co-simulation. The users can generate their own ROM for specific target.

/ Hardware-in-the-loop (HIL) connectivity

Ansys VRXPERIENCE Sensors uses raw sensor output to feed actual smart sensors being tested on a hardware-in-the-loop (HIL) test bench. It connects to the image injection box, which replaces the actual imager (inter-integrated circuit, or I2C) with the virtual image. The injection box also manages high-speed connections between the imager and the car-to-infrastructure (C2I) processing chip.

Ansys VRXPERIENCE Sensors Features	PRO	PREMIUM
Basic Driving Scenario	●	●
Ground-truth Sensor	●	●
Camera Sensor	●	●
Lidar Sensor	●	●
Radar Sensor	●	●
HiL Connectivity		●
Multi Sensors Simulation		●

/ Ansys VRXPERIENCE product line

- VRXPERIENCE Driving Simulator powered by SCANeR™
- VRXPERIENCE Sensors
- VRXPERIENCE Headlamp
- VRXPERIENCE HMI
- VRXPERIENCE Perceived Quality
- VRXPERIENCE Sound

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